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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Building The Wireless Future™

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**Michael F. Altschul**
Vice President,
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August 3, 1995

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W. - Room 222
Washington, D.C. 20554

DOCKET FILE COPY ORIGINAL

RE: Ex Parte Contact - CC Docket No. 94-102

Dear Mr. Caton:

On Thursday, August 3, 1995, Michael Altschul, Vice President and General Counsel, CTIA, met with Mr. John Cimko, Chief, Policy Division, Wireless Bureau, and his staff members, Ms. Nancy Boocker, Mr. Daniel Grosh, and Mr. Todd Lantor. The discussion concerned the proceedings regarding the provision of "E-911" services by wireless carriers, and expressed CTIA's positions as previously filed in the above-referenced docket, as well as in the attached document.

Pursuant to Section 1.1206 of the Commission's Rules, an original and one copy of this letter and the attachment are being filed with your office.

If there are any questions in this regard, please contact the undersigned.

Sincerely,

Michael F. Altschul

Attachment

No. of Copies rec'd 0+1
List A B C D E

NENA

# NENA News

A PUBLICATION OF THE NATIONAL EMERGENCY NUMBER ASSOCIATION VOL. 13 NO. 2 • JUNE 1995

NASHVILLE '95

9 - 1 - 1 National Emergency Number Association

## 1995 Annual Conference Nashville, TN

One Nation 9-1-1 One Number

# Wireless & 9-1-1

## The Rhode Island 9-1-1 Cellular Emergency Call System

*by Colonel Ernest E. Ricci*

Change, and resistance to change, is inevitable. In the public safety emergency communications service, we would like to think that whatever procedural changes we implement are made for the greater good of the public. Usually they are, when they are made in response to an actual public need rather than one perceived, or anticipated.

The advent of cellular communications systems generated a public safety need to process emergency cellular calls efficiently — differently than conventional telephone calls, primarily because of the fixed vs. mobile status of the caller. There is no universally prescribed method. In fact, because public safety communications systems nationally do not follow a universal number 9-1-1, they maintain unique characteristics as determined by size, type of service, jurisdiction, etc., which in turn govern the choice of processing method(s).

The State of Rhode Island's 9-1-1 cellular communications system retains its own hybridized call processing characteristics. The development of the 9-1-1 cellular emergency call processing system in Rhode Island, why it developed in that manner, some of the little known technical shortcomings in the system, and how one can learn to better utilize the cellular 9-1-1 emergency communications system, are the subjects addressed in this article.

On July 10, 1994, nearly six years after the establishment of the Statewide 9-1-1 Communications System, the Rhode Island Enhanced 9-1-1 Emergency Telephone Division began processing cellular 9-1-1 calls. The separation in time was not intended by the system's planners. In fact, when the Enhanced 9-1-1 system was implemented in 1988, plans to include cellular 9-1-1 were in place at that time. What was lacking was the legislative component

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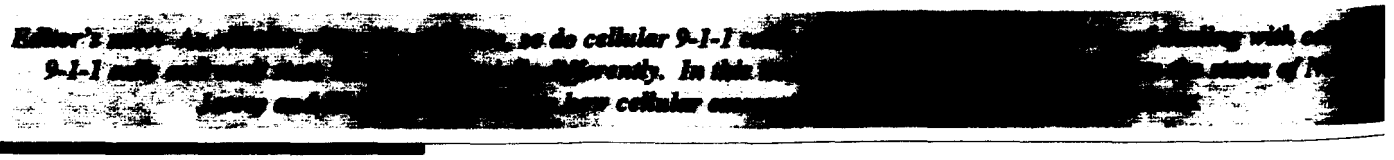

## Rhode Island

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which would have allowed the assessment of a user fee for cellular subscribers.

There were two major schools of thought concerning the imposition of a user fee on cellular calls. Those against the user fee held that:

1. Cellular callers would be providing a public safety service by reporting emergencies on public highways; and
2. The cellular system does not contain the automatic location and other Enhanced 9-1-1 features associated with the wire-based system, and since E9-1-1 fees attach to the need to support the E9-1-1 features, cellular users should not be included.

The proponents of the cellular fee issue argued that:

1. Cellular usage extends beyond highway use, and in time the cellular phone would be used as extensively and certainly for the same variety of emergency purposes as the wire-based telephone;
2. The costs associated with the E9-1-1 system attach more to personnel costs than to the hardware costs; and
3. In fact, a greater personnel effort is extended to cellular calls because they lack automatic location features.

A legislative bill was introduced which would have assessed the same $.47 surcharge against cellular subscribers (per telephone number) as exists for the wire-based 9-1-1 system (per telephone line).

While the pros and cons of the cellular user fee proposal were being considered by the legislature, the responsibility for receiving and processing cellular 9-1-1 calls was assigned to the Rhode Island State Police (RISP) — no user fee attached. Cellular call processing was thus provided free of charge by a simple but effective transfer of responsibility. The legislative question of the appropriateness of imposing a user fee against cellular subscribers became moot. Cellular lobbyists were pleased; the political committees who no longer had to make a decision were relieved, and it appeared that the issue was resolved for once and for all, but that was not to be.

It turned out that not everyone was satisfied with the result, least of all the labor union which represents the 9-1-1 telecommunicators. Their argument was that the 9-1-1 call processing task was, by authority of the state labor board, to have been assigned exclusively to the certified 9-1-1 bargaining unit. To have assigned bargaining unit duties to a non-bargaining unit organization constituted, it was alleged, a violation of the State Labor Relations Act. After conducting the required hearings, the State Labor Relations Board rendered a decision on November 27, 1993, which was favorable to the bargaining unit. All 9-1-1 calls, cellular and wire-based, are now processed exclusively by the Rhode Island Enhanced 9-1-1 Statewide system.

The user fee assessment question was not at issue at the Labor Board hearings; therefore, the fee conditions did not change. Cellular users are not charged for the processing effort, and landline 9-1-1 users support the costs for the entire system through a monthly $.47 surcharge assessed per billable line. It may be interesting at this point to learn why the State Police were given the 9-1-1 cellular call processing assignment. Aside from the obvious fee avoidance motivation in this case, there is precedent across the country for directing cellular 9-1-1 calls to the State Police. Perhaps rather than using the term "9-1-1 calls," a more appropriate term would be "emergency calls" since many State Police agencies do not use the digits 9-1-1, but designate other numbers, letters, or symbols in combination for cellular subscribers to call for reporting emergencies on the states' highways. In many jurisdictions, cellular technology preceded 9-1-1 implementation, which would explain the use of other numerals.

***It will only be a matter of time before cellular calls, in general, will equal or exceed landline calls in the 9-1-1 operations center.***

The precedent eluded to makes sense when you think of cellular calls as being generated from motorists on the highway system. Under those circumstances, the State Police, whose jurisdiction covers the entire state highway system, is the logical choice:

1. Their jurisdiction extends statewide. The caller does not need to know which political jurisdiction corresponds to the caller's location.
2. The caller does not need to know several numbers associated with several jurisdictions.
3. One number will connect the caller with the appropriate service provider.
4. Cellular communications from an automobile on a highway system is by far the best, if not the only, means for reporting emergencies.

The cellular/State Police connection works particularly well in jurisdictions where 9-1-1 does not exist statewide, county-wide, or at the municipal level or where 9-1-1 is otherwise used sporadically throughout the state. Today, however, with the proliferation of 9-1-1 systems throughout the United States, we see a different set of conditions relative to cellular users, cellular technology, and enhanced 9-1-1 systems deployment.

Cellular phones are no longer permanently affixed to an automobile. They are not necessarily used on a state highway system, but are used in the home or office, at a sports arena, the golf course, the beach, etc. Because of the mobility associated with cellular telephones and the size, range, and other quality improvements which have been introduced, more emergency calls are now being generated by cellular users from other than highway locations than was the case only months ago. It will only be a matter of time before cellular calls, in general, will equal or exceed landline calls in the 9-1-1 operations center.

What was an acceptable, appropriate method for processing cellular emergency calls in the relatively recent past may no longer be appropriate. Given an available, effective alternative, the State Police in any jurisdiction would prefer not to process cellular requests for fire services, emergency medical needs associated with illness or accidents in the home, law enforcement incidents in an urban jurisdiction or any of a number of other off-highway emergency activities. Burdened with such non-appropriate cellular calls, the State Police communications center becomes a transfer agency, providing services which detract

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from the primary functions of the State Police.

Rhode Island has in place a transfer agency for effectively processing cellular 9-1-1 calls; a statewide, E9-1-1 PSAP which uses the transfer method for connecting the 9-1-1 caller with the appropriate public safety agency(s). Today, the Rhode Island State Police are receiving their 9-1-1 cellular calls for service through the statewide 9-1-1 system absent non-jurisdictional fire, rescue, and redundant jurisdictional calls. The State Police receive no more than three calls for the same incident and 9-1-1 telecommunicators inform all subsequent callers that help is on the way. In addition, 9-1-1 telecommunicators stand ready to assist the State Police in completing any extended communications effort.

The entire 9-1-1 cellular system, including cellular service companies, the Rhode Island public safety emergency service providers, and the user population are benefiting from the cellular call processing modification. It was, after all, a change that would have eventually been required to conform to the emergency communications changes taking place in the cellular telephone user population.

### The Rhode Island Cellular Configuration

All 9-1-1 cellular calls are initially received by the statewide E9-1-1 PSAP. The state is dissected into quadrants and each quadrant is associated with a State Police barracks. All 9-1-1 calls picked up by cells within each quadrant are programmed to be automatically directed to the barracks serving that quadrant if the State Police is the appropriate agency for that call. When the call is answered, the 9-1-1 telecommunicator's screen displays the time and date of call; the class of service (cellular), and the RISP barracks appropriate to the quadrant within which the call was made.

This modified automatic location information (ALI) is reliable only in that it identifies the call as cellular. Whether the call is picked up by the cell appropriate to the caller location (which determines the barracks jurisdiction) is not very reliable. Cell locations across state lines will often pick up a foreign cellular signal when the motorist is traveling close to state boundaries. Within the established intrastate quadrants are sixteen boundaries which could result in errant transmissions, and often do. When a 9-1-1 call is automatically (electrically) transferred to the barracks displayed on the telecommunicator's screen, the caller is then speaking with a State Police officer.

In cases where the call is picked up by a foreign cell, the call is automatically transferred to an inappropriate barracks and a second transfer is conducted by the State Police dispatcher. The caller is debriefed twice and often expresses dissatisfaction with the 15-20 second delay in processing.

In the cellular world, such occurrences are often unavoidable, but because the user is unaware of the Rhode Island cellular processing protocol and the inherent shortcomings of the cellular network, the user is critical of the 9-1-1 system as a whole. Some expect the impossible; a technologically perfect system which works to their standards of satisfaction 100% of the time. How soon we forget that only a few years ago, a serious accident or incident on a highway was reportable only by emergency call box (if they existed and if they were operable). The other alternative was to take the next exit off the highway and find a public telephone booth, or an open business where a telephone was available. Of course, you could awaken the resident of the nearest home and ask to use the telephone. Would you agree that any of those alternatives would exhaust more than 15-20 seconds? Maybe 15-20 minutes?

In such cases, a modification in the call processing procedure could save time and avoid criticism. Rather than transfer the caller from the receiving barracks to the appropriate barracks by the initial State Police call taker, the data could be relayed by radio or by telephone and the cellular caller reporting the incident need not be involved beyond the initial call.

As to the time absorbed in giving information to a 9-1-1 telecommunicator, it is not necessary for the caller to recite a full description of the event. That exhausts valuable time. The 9-1-1 telecommunicator needs to know only whether the matter warrants a police, fire, or emergency medical transfer. Obviously, a whole new public education effort must be launched to explain the cellular call processing system and the advantages/impediments inherent in the technology.

A few suggestions to cellular users when reporting a 9-1-1 emergency (we define a 9-1-1 emergency as any incident which requires immediate police, fire or emergency medical attention):

1. Know the location of the incident you are reporting, and be able to communicate that location clearly to the dispatcher at the service agency — police, fire, medical.
2. Speak slowly and distinctly.
3. Turn off, or turn down the volume on your car radio, and if necessary, close your car windows. Often background highway sounds are overpowering.
4. If you are asked to repeat, please do so. It's not that we are not paying attention; reception is sometimes of poor quality. Your car may be passing under a bridge abutment, or between two eighteen-wheelers. Those conditions could interfere with your radio transmission, at least intermittently.
5. If you can't get through, hang up and dial again.

Radio waves are often unable to overcome certain topographic conditions, atmospheric conditions, etc. In the world of radio waves, such occurrences are unavoidable. Even top-of-the-line public safety radio communication systems are susceptible to radio transmission/reception problems. It is not uncommon for a police or fire department whose jurisdiction covers a relatively small area to have to install repeaters at strategic points within their jurisdiction to overcome weak reception. We might have had less difficulty adjusting to the idiosyncracies of a cellular phone if we had just called it by its proper name — a mobile radio, radio telephone or a cellular radio. They use radio waves which are converted and interfaced (interconnected) with hardwire telephone lines.

If we continue to equate cellular radio performance with a wire-based telephone, we will continue to be disappointed. Although both have their inherent benefits, they also have shortcomings, and they are two different technologies. After all is said and done, both cellular and wire-based telephones play an indispensable role in improving the quality of life for those who keep them in good condition, use them properly, and accept them for what they are — man-made instruments with less than magical powers.

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*Colonel Ricci is executive director of the E9-1-1 Uniform Emergency Telephone System in North Providence, Rhode Island. He can be reached at 401-354-0911; Fax 401-354-0933.*

# Wireless & 9-1-1

## Cellular 9-1-1 in New Jersey

*by S. Robert Miller and Craig A. Reiner*

### Call Forwarding of Cellular 9-1-1 Calls

New Jersey Law treats cellular telephone companies in the same manner as other Local Exchange Carriers (LECs). State 9-1-1 regulations authorized the Office of Emergency Telecommunications (OETS) to direct cellular calls to PSAPs, as OETS deemed appropriate. Originally, the cellular vendors were each provided a 7-digit (or 10-digit) telephone number to call forward their 9-1-1 calls. This allowed the calls to be answered at PSAPs where special cellular circuits were installed. However, the location of the caller or cell site were unknown to the 9-1-1 attendant.

The first cellular 9-1-1 calls in New Jersey were directed to the Gloucester County Public Safety Answering Point (PSAP) in late 1986. In 1987, prior to the passage of the 9-1-1 Act which mandated the implementation of a statewide 9-1-1 system, New Jersey changed its method of handling cellular 9-1-1 calls. 9-1-1 calls from cell sites in Burlington County and Bergen County were directed to those county communications centers. All other 9-1-1 calls placed by cellular phones were directed to one of three New Jersey State Police (NJSP) regional dispatch centers. These centers are located in Hammonton, Troop "A," covering the southern part of the state; Totowa, Troop "B," covering the northern part of the state; and West Trenton, Troop "C," covering the central part of the state.

When a call for assistance is received at one of the NJSP dispatch centers, the communications operator interrogates the caller to determine the location of the emergency, then transfers the caller to the most appropriate agency, via a 7-digit telephone number. Each NJSP dispatch center utilizes a computerized telephone auto-dialer to accomplish this transfer. The auto-dialer contains the emergency police numbers for every municipality and locality throughout New Jersey. To accommodate out-of-state cellular 9-1-1 calls, selected locations in Pennsylvania,

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Editor's note: [illegible] 9-1-1 calls [illegible]

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Delaware, and New York are also included in the auto-dialer directory. To route the call to the correct agency, the communications operator must rely on the information provided by the caller. At times that information is incorrect or unknown and determining a location is a time consuming process.

This method was implemented at a time when the use of cellular phones was not widespread, due to the high cost of purchasing the phone and a cellular network that was still in its inception. During this time, good cellular coverage was largely limited to the urban areas of the state. Today, however, cellular coverage is statewide.

In 1989, the 9-1-1 Act was signed into law, mandating the installation of a statewide 9-1-1 system. The 9-1-1 Act required OETS to establish a State plan for an emergency enhanced 9-1-1 system within 270 days of the operative date of the Act. In January 1990, the State 9-1-1 Plan was adopted which addressed cellular as follows:

> *The cellular mobile telephone has the ability to constantly move from municipality to municipality, across county borders and state lines. Thus, the cellular telephone number cannot be used to identify the location from which the call originated. However, cellular mobile telephones must be integrated into the 9-1-1 network to the extent possible considering the current state of technology.*

> *The cellular mobile telephone companies must transmit to a New Jersey Bell 9-1-1 tandem, via a single common trunk group, a unique seven-digit identification number for each cell site, or if so configured, each sector at the cell site. The 7-digit number will be the cell site or sector cell where the 9-1-1 call originated. This number will be treated by the 9-1-1 tandem similar to an automatic number identification (ANI) for that particular emergency call and selectively routed to a PSAP designated by OETS after consultations with counties and municipal 9-1-1 coordinators.*

> *All cellular site locations must be included in the ALI data base. This information is beneficial to the PSAP attendant as a starting reference point for cellular 9-1-1 calls. The cellular mobile carriers shall provide New Jersey Bell and OETS with cell site locations for all existing cell sites and any new cell sites added to their network.*


The State 9-1-1 Plan led to 9-1-1 Regulations, adopted by the Attorney General in April 1990. These regulations, subchapter 7(13:81-7.1), require cellular companies to participate in this system as follows:

> *Each cellular mobile telephone company shall transmit to a New Jersey Bell 9-1-1 tandem, via a single common trunk group, a unique seven-digit identification number for each cell site, or if so configured, each sector at the cell site. This number will be selectively routed to a PSAP designated by OETS after consultation with county 9-1-1 coordinators and municipalities.*

The use of cellular phones has increased continuously in New Jersey. In 1988 the average daily cellular 9-1-1 call volume at the NJSP Cellular PSAPs was 39 calls. Today, the average daily call volume of cellular 9-1-1 calls exceeds 500 calls ***(see Figure 1).***

This call volume will dramatically increase as cellular use becomes more widespread and new communication services, such as Personnel Communications Systems (PCS) are inaugurated. All of New Jersey's interstate highways encourage the use of cellular 9-1-1 as seen by the installation of the signs along the roadway, indicating "EMERGENCY 9-1-1 CAR PHONE."

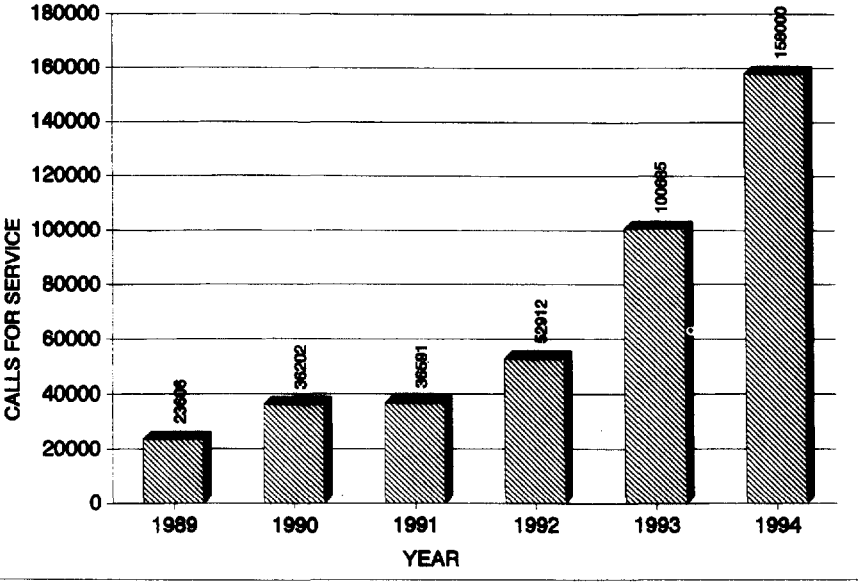
With the wireless communications industry expanding, the use of these wireless devices for reporting emergencies will be commonplace. Studies indicate that a large percentage of these devices are purchased for the purpose of security when traveling the highways. Cellular companies have been using this as a marketing strategy.

Currently, the only accurate piece of information available to route calls is the location of the cellsite receiving the 9-1-1 call. While this is not enough information to determine the exact location of the caller, in many areas of the state it allows the caller to be directed to the most appropriate PSAP, based on the coverage area of the cell site. Once answered at the PSAP, further interrogation is made by call-takers most familiar with that general region.

## Exsisting Cellular Telephone Technology

The FCC has allocated a 25 MHz. spectrum for cellular use. This spectrum is divided into two 12.5 MHz. bands. One

**Figure 1 - NJSP Cellular 9-1-1 Calls**



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band is to be used by the non-wireline cellular provider, referred to as the "A side." The other band is used by the wireline cellular provider, referred to as "B side." All areas where cellular service is offered have two cellular providers, generating competition. In New Jersey, the wireline provider is Bell Atlantic Mobile Systems. Non-wireline providers throughout the state include Comcast, Metrophone, Ocean County Cellular, and others. A new provider of wireless communications in New Jersey, similar to cellular, is Nextel.

The basic concept in a cellular system is frequency re-use. This concept is implemented by employing a pattern of overlapping cells. Each cell is viewed as a hexagon.

A cellular telephone system typically includes many cell sites throughout a region. The population density and the amount of cellular traffic determine the amount and size of cell sites. Based on design, cell sites are usually spaced anywhere from one-half of a mile to as much as twenty miles apart. Each cell site generally comprises one or more antennas mounted on a triangular platform. These antenna platforms are placed on top of towers or large buildings, fifty to three hundred feet above the surrounding terrain. Cell sites utilizing three antennas are sectorized, and each antenna sector is designed to cover a 120 degree area.

The cell sites are connected to a centrally located cellular switch, referred to as a Mobile Telephone Switching Office (MTSO). The MTSO is basically a telephone switching office as far as hardware is concerned, but it uses a substantial amount of additional equipment programmed for cellular control. It not only connects the system to the telephone network, but continuously monitors signal strength during a call, and switches the cellular phone from cell site to cell site when necessary as the unit moves. The MTSO also records call information for billing purposes.

Cell sites are arranged in clusters where each cell site is assigned a separate set of channels. These channels can be re-used in each cluster, making frequency re-use possible. Each cell site has at least one control channel dedicated for signalling between the cell and the mobile unit. The remaining channels are for conversation. Ideally, the signal generated from each cell site is strong enough to provide coverage within that cell, however not powerful enough to interfere with a cellsite in an adjacent cluster utilizing the same channel.

The cellular telephone unit consists of a control unit, a transceiver, and appropriate antenna. All cellular telephones have the capability of receiving all of the 666 channels in the 800 MHz. range allocated for cellular use. Each cellular phone has its own telephone number assigned, like any other telephone. Calling from a cellular is much like dialing any other phone, utilizing area codes and the number called.

When a cellular phone is turned on, it monitors data being transmitted on a control channel by the cell with the strongest signal. If the strength of the signal becomes weak as the cellular phone travels through the region, the unit searches for a channel with a stronger signal from another cell. Once a cellular call has been originated, the process of monitoring signal strength continues, and the call may be handed off to another cell site as the vehicle travels down the highway.

A cellular phone is capable of placing a call wherever cellular service is available. If the call is outside of the cellular area covered by the purchased plan, there is usually an additional cost called a roaming charge. With this feature, someone who purchased a cellular plan in Maine would be able to place a 9-1-1 call from their cellular phone while traveling through New Jersey.

The ability of a cellular phone to receive a call when outside their cellular coverage area is not as easy as placing a call. Unless the subscriber has purchased an option that will track the movement of the cellular phone from system to system, a special number must be dialed prior to the cellular phone number. This number is referred to as the "roamer access number." When dialed, calls can be completed to subscribers outside their coverage area. If that individual from Maine calls 9-1-1 to report an emergency on the New Jersey Turnpike, between exit 2 & 3, and the call-taker obtains the caller's cellular phone number to call that person back, the call-taker would need to do the following: (1) determine the correct roam access number for the cellular system that processed the 9-1-1 call, (2) dial the roam access number and wait for a second dial tone, and (3) dial the area code and the cellular phone number of the cell phone.

In a perfect environment, cellular calls would be received and processed by the cell site closest to the unit placing the call. This is not always the case. Due to excessive channel loading, and the nature of radio signal propagation, many times calls are processed by what would appear to be an inappropriate cell site. This condition occurs frequently and as a result, NJSP locations receive 9-1-1 calls originating in Pennsylvania, Delaware, and New York.

### Routing of Cellular 9-1-1 Calls by Cell Site/Sector

As discussed earlier, the present technology used in cellular 9-1-1 cannot transmit the location of the cellular phone placing the call. In addition to not knowing the location, the subscriber's name cannot be displayed on the ALI screen. When a 9-1-1 call is placed from a cellular phone, the call will enter the New Jersey 9-1-1 network and be selectively routed to the appropriate PSAP as determined by OETS. An evaluation of each cell site is made, based on the geographic location and coverage area, from information supplied by each cellular company.

Each cell site, or sector if the cell site is sectorized, is assigned a unique 7-digit telephone number, called the Pseudo Automatic Number Information (PANI). This number enables 9-1-1 calls received by that cell site to be selectively routed to the PSAP *(see Figure 2)*. These 7-digit number assignments all have the area code of 908 and the NXX (or exchange) of 250. The assign-

### Figure 2 - Current Cellular 9-1-1 ALI Screen

| | |
|---|---|
| CAUTION message (CELLULAR CALL)→ | •CAUTION• CELLULAR CALL |
| Cell Site ANI, time, date→ | 908-250-6002 09:30:25 02-22-94 |
| Cellular carrier→ | COMCAST CELLULAR COMMUNICATIONS |
| Cell Site address information→ | 000000 U S ROUTE 40 |
| Cell Site address information (cont.)→ | RT |
| Cell Site coverage area→ | RADIUS 05 MILES |
| Municipality of Cell Site location→ | ELMER BORO XX |
| Cell Site Latitude & Longitude→ | 39-35-52N 75-09-21W |
| Class of service (CELL)→ | CELL |
| Blank line→ | |
| Roamer access number for Cell Site & ESN→ | PILOT # 609-774-7626 ESN 5397 |
| Name of PSAP call should be routed to→ | SALEM COUNTY COMMUNICATIONS |
| Agency F1 button programmed for→ | F1=ELMER BELLMAWR 935-0550 |
| Agency F2 button programmed for→ | F2=ELMER BRIDGETON 451-0100 |
| Agency F3 button programmed for→ | F3=VINELAND CITY PSAP 696-1212 |

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ment of these numbers is coordinated between Bell Atlantic, the cellular providers, and OETS.

When a cellular 9-1-1 call is received at the PSAP, it must be understood by the call-taker that the information displayed on the ALI screen represents information about the cell site, not the caller. Information that will be displayed on the screen includes the name of the cellular company, location of the cell site, name of the PSAP, roamer access number, and possible transfers that may be needed. No information about the caller or their location will appear on the ALI screen.

To allow the 9-1-1 network to selectively route the cellular calls, each cell site, or cell site sector had to be assigned its own unique emergency service number (ESN). In order to accomplish this, the data base for cell sites had to be uniquely different from the existing data base. The method used to separate the data bases was the construction of a data base using the pseudo state abbreviation of XX. On the ALI screen, cellular calls will be from the state of XX.

The selective transfer buttons, police, fire, EMS, have been modified for each ESN, based on the cell site coverage area. When cellular calls need to be redirected, they can be transferred over the 9-1-1 network, via the selective transfer buttons. If the receiving agency has enhanced 9-1-1 equipment, they will also receive the screen information.

Each cell site is evaluated by OETS and similar modifications are made to the selective transfer buttons at each PSAP. For example, in Salem County some buttons are programmed for Delaware State Police and Chester, Pennsylvania, Police. The northern part of the State will have some buttons programmed for New York State Police Departments as appropriate. The programming of these buttons will most likely be agencies not commonly utilized by that PSAP.

### Routing of Cellular 9-1-1 Calls by Latitude/Longitude

In an effort to stimulate the development of an accurate location system, OETS in concert with its 9-1-1 tandem vendor and telephone local exchange carriers, demonstrated a real-time coordinate-based ALI test during the week of October 3, 1994. Coordinate-based selective routing software allowed cellular calls to route to the appropriate PSAP based on the cellular caller's X-Y coordinates. Once the cellular caller was connected to the assigned PSAP, a PC terminal at the PSAP operator's position displayed a map showing the actual location of the cellular caller, along with the longitude and latitude, the heading, the speed, and the cellular's call back number. Representatives of the cellular industry and public safety entities were invited to attend. All in attendance agreed that the system, as demonstrated, worked extraordinarily well and such a system could be implemented within two years.

There were two main components of the wireless ALI test: first, the method used to determine the location of the wireless caller; second, the method used to route the call to the appropriate PSAP and to display the information. For the New Jersey demonstration, the RALI (Roving Automatic Location Identification) system developed by Smith Advanced Technology, Inc., utilizing an advanced Rockwell global positioning system (GPS) receiver chip, was used. RALI, in conjunction with the Rockwell specialized 9-1-1 tandem, successfully routed the cellular calls to the appropriate PSAP, based on the real time X-Y coordinates determined by the RALI cellular unit.

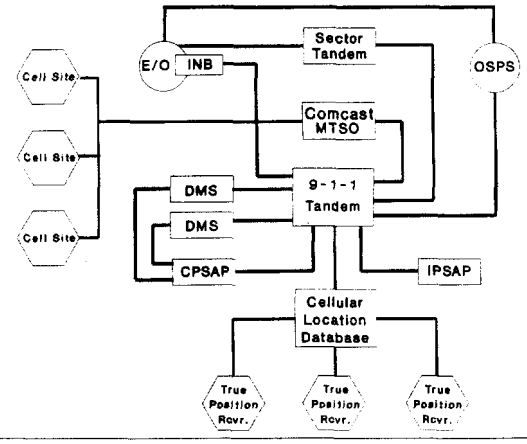
The calls terminated on two RALI PC terminals located at the testing PSAP in Gloucester County, New Jersey. One terminal displayed the caller's position and call-back information on a street level map for the Gloucester County emergency service zones (ESZ) and a second terminal yielded the same for ESZs in the Philadelphia area. In addition to Rockwell and Smith Advanced Technology, other participants in the test included Bell Atlantic, Gloucester County Communications Center, and KML Technologies.

Based on this demonstrated technology, it is clear that GPS is a satisfactory way of determining the location of cellular callers utilizing mobile cellular phones with an external roof-mounted GPS antenna. Portable 600 mW phones with a self-contained GPS antenna were not demonstrated. Moreover, the next generation of wireless telephones (PCS) will be portable devices. Therefore, a question remains as to the effectiveness of GPS embedded in a handheld portable cellular phone with a self-contained antenna. Future advancements in GPS might be able to bridge this gap; otherwise a second locational system may also have to be used.

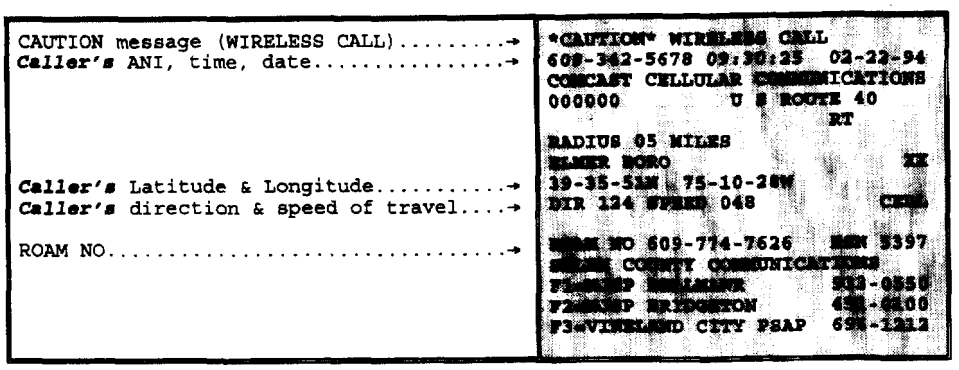
An additional wireless 9-1-1 beta test, using time-difference-of-arrival (TDOA), will be conducted in the fall. The trial is scheduled to begin on November 1, 1995, along the New Jersey Turnpike (NJTP) from the Delaware and New Jersey State border (exit 1) to Bordentown (exit 7), an approximately 50 mile section. This will be a trial of the Associated Group's TruePosition 9-1-1 cellular system. Others cooperating in the trial, include Bell Atlantic, Rockwell, Comcast, KML, and GTE.

The exact coverage area must still be engineered, and is dependent upon tower sites. The coverage area would also be expected to cover several municipalities surrounding the NJTP, and most of I-295 as it runs parallel. Based on the true latitude and longitude of the cellular caller, the calls will be selectively routed to one of four County 9-1-1 PSAPs (Salem, Gloucester, Camden, Burlington) participating in the trial. For the trial, Comcast and Bell Atlantic 9-1-1 trunks will utilize Feature Group D signalling which will allow for the provision of both the pseudo ANI representing the cell site and sector, and the actual cellular's (call-back) ANI *(see Figure 3)*. Selective fields will be overwritten in the

**Figure 3 TruePosition Network**



## Figure 4 - TruePosition Demonstration 9-1-1 ALI Screen




ALI records to yield the true caller's ANI, latitude & longitude, speed, and direction of travel *(see Figure 4)*.

Other promising systems are waiting evaluations by the cellular industry and the public safety community. New Jersey has spent considerable effort researching methods available for locating and routing wireless 9-1-1 calls and feels that a decision on the best method of wireless ALI and ANI must be dependent on trials and evaluations. We feel that the FCC's five year proposal for wireless ALI and ANI (see FCC Notice, para. 51.) can and must be met without delay, and that this could even be accomplished within four years if the cellular industry would make it a priority. Testing and evaluations could be accomplished within two years and hardware and software modifications could be achieved within two additional years. Therefore, New Jersey has urged the Commission in its comments to mandate wireless 9-1-1 ALI and ANI features similar to wireline 9-1-1 within four years.

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